भारतीय मानक
Indian Standard

IS 7231 : 2021

शौचकुण्डों व मूत्रालयों के लिए प्लास्टिक की प्रधावन टंकियाँ — विशिष्टि

(तीसरा पुनरीक्षण)

Plastic Flushing Cisterns for Water Closets and Urinals — Specification

(Third Revision)

ICS 91.140.70

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December 2021 **Price Group 7**

Sanitary Appliances and Water Fittings Sectional Committee, CED 03

FOREWORD

This Indian Standard (Third Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Sanitary Appliances and Water Fittings Sectional Committee had been approved by the Civil Engineering Divisional Council.

This standard was first published in 1974 and subsequently revised in 1984 and 1994. In the first revision of the standard, its scope was extended to cover dual flush type cisterns allowing a reduced flush of 5 litres and full flush of 10 litres.

In the second revision of the standard, apart from general updation required in view of advancements in the field of manufacturing and use, the four amendments issued to the first revision of the standard were incorporated. Through Amendment No. 5 to the second revision of the standard issued in January 2016, single flush cisterns of 10 litres and 6 litres capacity were deleted so as to ensure water saving by promoting use of dual flush cisterns.

In this revision of the standard, the following major modifications have been incorporated:

a) High level cisterns, which were intended to operate at a minimum height of 1 250 mm between the top of the pan and the underside of the cistern, have been discontinued.

b) Dual-flush cisterns of capacity 10/5 litres have been withdrawn and cisterns of capacity 4.8/2.8 litres and 4/2 litres have been included.

c) Materials for cistern accessories, such as flush pipe and coupling nut and lock-nut have been modified as per the current manufacturing practices. Those materials use of which have become obsolete, such as, lead tube/brass tube/steel tube/copper tube flush pipes have been deleted.

d) Provisions on close-coupled cisterns which are dealt in IS 2556 (Part 8) : 2021 ‘Vitreous China sanitary appliances — Specification : Part 8 Specific requirements of close-coupled and one-piece pedestal washdown and syphonic water closets’ have been deleted.

e) Provisions for concealed cisterns have been added.

f) Endurance test criterion for cisterns has been modified to specify 30 000 operations from existing 3 000 operations.

g) Additional requirements for water efficiency rating and labelling of cisterns have been incorporated through reference to the concerned Indian Standard.

Flushing cisterns of ceramic (vitreous China) are covered in IS 774 : 2021 ‘Ceramic (vitreous China) flushing cisterns for water closets and urinals — Specification (*sixth revision*)’.

The composition of the Committee responsible for formulation of this standard is given in Annex E.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 ‘Rules for rounding off numerical values (*revised*)’. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

PLASTIC FLUSHING CISTERNS FOR WATER CLOSETS AND URINALS — SPECIFICATION

(Third Revision)

1 SCOPE

1.1 This standard covers requirements for manually operated dual-flush plastic flushing cisterns of capacities 6/3 litres, 4.8/2.8 litres and 4/2 litres for water closets (WC) including squatting pans and urinals, together with flush pipe details.

1.2 This standard does not cover ceramic (vitreous China) flushing cisterns and close-coupled cisterns, which are covered in IS 774 and IS 2556 (Part 8), respectively.

2 REFERENCES

The standards listed in Annex A contain provisions, which through reference in this text constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated in Annex A.

3 TERMINOLOGY

For the purpose of this standard, the following definitions shall apply.

3.1 Cistern — A flushing device intended to operate at a height not exceeding 300 mm between the top of the pan and the underside of the cistern.

NOTE — In case of Orissa pan/squatting pan, minimum distance between top of the pan and the underside of the cistern shall be 700 mm.

3.2 Close-Coupled Cistern — A cistern intended to operate, placed on the flat surface provided at the back portion of washdown water closets.

3.3 Dual-Flush Cistern — A construction that enables the user to cause a reduced flush of partial discharge when only urine needs to be flushed away instead of the customary full flush.

NOTE — A typical illustration showing parts of a dual flush cistern is given in Fig. 1.

4 MATERIALS

The materials for manufacturing various components of the flushing cisterns shall conform to the requirements given in Table 1.

NOTE — Where the requirements for the material of any component or the relevant Indian Standard designation for any material are not specified, these shall be as agreed to between the manufacturer and the purchaser.

5 CONSTRUCTION

5.1 Exposed and Concealed Cistern

5.1.1 *Exposed Cistern*

The thickness of the body including cover at any point shall not be less than 2 mm for glass fibre reinforced plastic (GFRP), and not less than 3 mm for other plastic materials. The cistern shall be free from manufacturing faults and other defects affecting its utility. All working parts shall be designed so as to operate smoothly and efficiently. The cistern shall be mosquito-proof. It shall be deemed to be mosquito-proof only when there is no clearance anywhere in it which would permit a 1.6 mm diameter wire to pass through. The outlet of each siphon or stand pipe or flush valve shall be securely connected to the cistern by means of a lock-nut. In the case of plastic siphon, it shall be provided with suitable means of ensuring and maintaining water tight and airtight joint to the cistern.

5.1.2 *Cover*

The cistern shall be provided with a removable cover which shall fit closely and shall be secured against displacement. In designs, where the operating mechanism is attached to the cover, the cover may be made in two sections, the section supporting the mechanism being securely fixed or booked to the body.

5.1.3 *Flush Pipe*

The outside diameter of the pipes shall be 38 ± 1 mm (*see* Fig. 2).

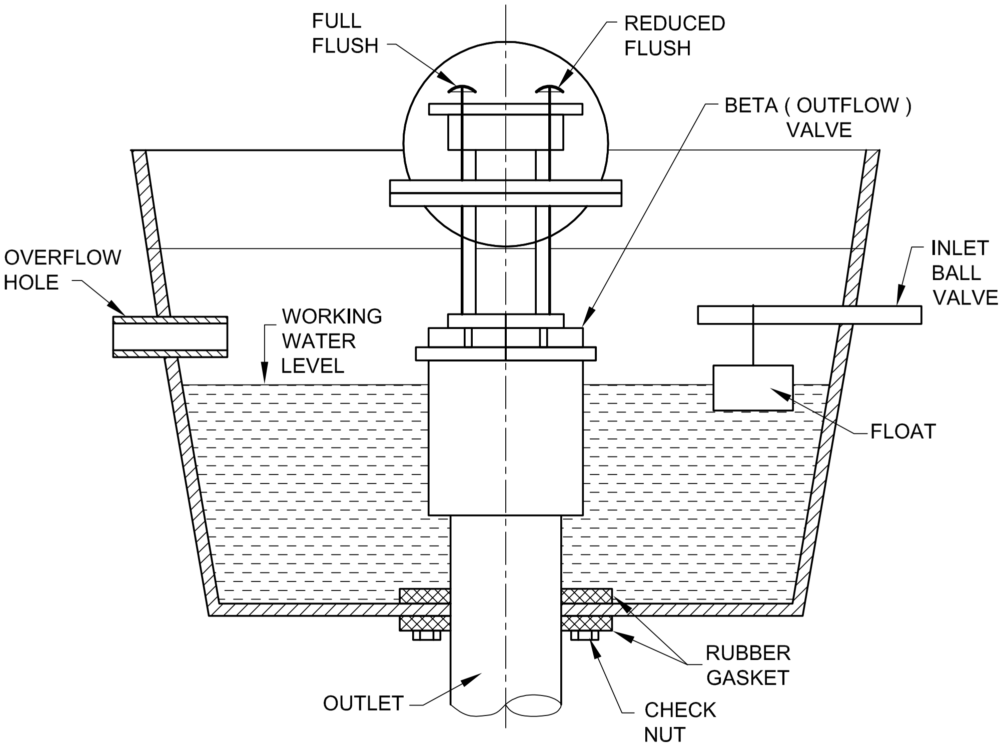

FIG. 1 TYPICAL ILLUSTRATION OF DUAL-FLUSH CISTERN

Table 1 Materials for Various Components of Flushing Cisterns

(*Clause* 4)

SI No.	Component(s)	Material	Requirement/Conforming to
(1)	(2)	(3)	(4)
i)	Cistern	High density polyethylene (HDPE) or	IS 7328
		Polystyrene, high impact or	IS 2267
		Polypropylene[1] or	–
		Acrylonitrile butadiene-styrene (ABS) or	–
		Glass fibre reinforced plastic (GFRP)	As per clause 4 of IS 11426
ii)	Flush pipe	Polyethylene pipe or	IS 4984
		Unplasticized PVC (Poly Vinyl Chloride) plumbing pipe or	IS 4985
		Polypropylene pipe	–
iii)	Cover	Same material as that of the cistern body	
iv)	Overflow pipe	Polyethylene pipe or	IS 4984
		Unplasticized PVC pipe or	IS 4985
		Any other corrosion–resistant material	–
v)	Beta (outflow) valve	–	IS 17585
vi)	Operating mechanism	Non-ferrous metal or any other corrosion- resistant material	–
vii)	Float valve	–	IS 12234/IS 13049
viii)	Polyethylene float for float valve	–	IS 9762
ix)	Coupling nut and lock-nut	Injection-moulded high density polyethylene (HDPE)/ Polyacetal/Polypropylene[1]	–

[1] Talc as filler, if used shall not exceed 20 percent.

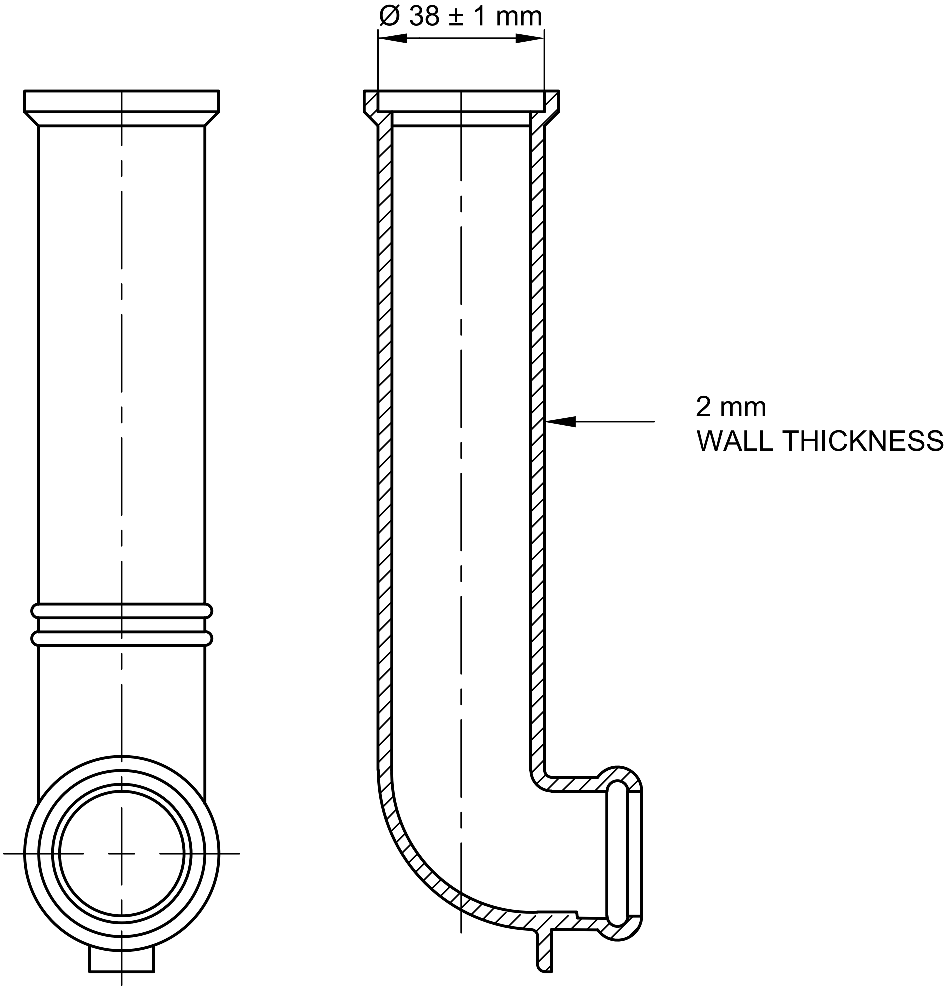

FIG. 2 FLUSH PIPE

5.1.3.1 *Flush pipe connection to cistern*

The flush pipe shall be securely connected to the cistern outlet and made airtight by means of a coupling nut. The nominal internal diameter of the cistern outlet shall be not less than 38 mm. The upper end of the flush pipe shall be provided with suitable means for ensuring and maintaining a water-tight and air-tight joint to the flushing cistern and the flush pipe shall be detachable from the flushing cistern. There shall be no leakage from the joint under a full load of 6 litres. The above test shall be conducted 10 times by removing and refixing the nut. The centre of the outlet hole shall be generally central to the length of the cistern. The visible length of the outflow valve, when fitted shall be 37 ± 2 mm (*see* Fig. 3).

NOTE — The length of the cistern outlet shall be the dimension from the bottom surface of the cistern to the end of the outlet after the cistern with siphon/stand pipe has been duly fitted with all washers, lock-nuts, etc.

5.1.4 *Inlet and Overflow Holes*

The cistern shall be provided with inlet and overflow holes, situated one at each end, which shall be capable of accommodating overflow pipe of not less than 20 mm nominal bore and a 15 mm size float valve (*see* **5.1.5**). The holes shall be cleanly moulded or drilled and the adjacent surfaces shall be smooth.

5.1.5 *Float Valve*

The float valve shall be of 15 mm nominal size and shall conform to IS 12234 or IS 13049.

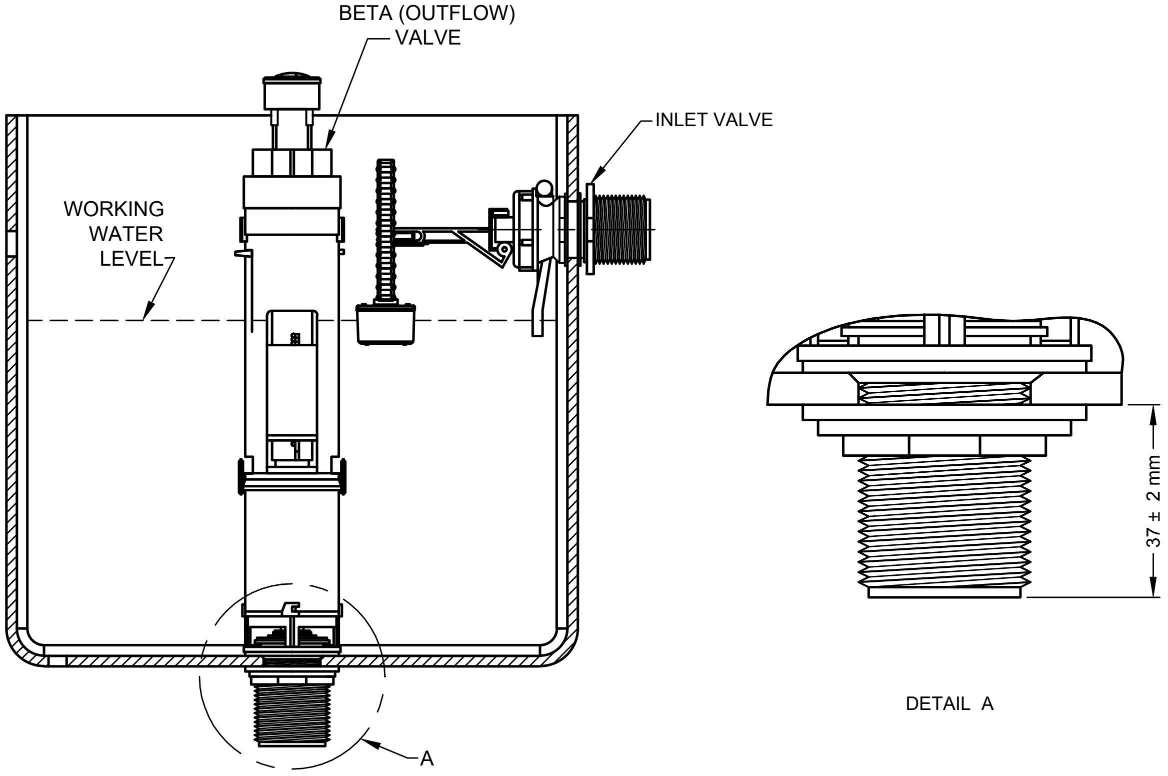

FIG. 3 VISIBLE LENGTH OF BETA (OUTFLOW) VALVE

5.1.6 *Operating Mechanism (Push-Knob)*

Each cistern shall incorporate a dual control method of operation that is, one initiating a full flush and other initiating a reduced flush. Discharge capacities shall be as follows:

Sl No.	*Cistern Discharge Capacity*	*Full Flush*	*Reduced Flush*
(1)	(2)	(3)	(4)
i)	6/3 litres	6 ± 0.5 litres	3 ± 0.5 litres
ii)	4.8/2.8 litres	4.8 ± 0.5 litres	2.8 ± 0.5 litres
iii)	4/2 litres	4 ± 0.5 litres	2 ± 0.5 litres

Particular attention shall be given to the ease of operation of the operating mechanism. The common operating mechanism is a push-knob system (*see* Note). The push-knob type operating mechanism shall be at the top of the cistern cover. Typical push knob design is given in Fig. 4.

NOTE — Dual control may be operated by two buttons, or two handles/knobs, or two concentric but separate knobs/handles or any other device in which one knob/handle actuates the full flush and the other knob/handle actuates the reduced flush.

5.1.7 *Overflow Pipe*

5.1.7.1 The overflow pipe shall be of not less than 20 mm nominal bore and shall incorporate a non-corrodible mosquito-proof device secured in a manner to permit it to be readily cleaned or renewed when necessary. No provision shall be made whereby the overflow from the cistern shall discharge directly into the water-closet or soil pipe without being detected.

5.1.7.2 The invert of the overflow pipe shall be minimum 19 mm above the working water level.

5.1.7.3 In case of overflow due to any reason, water should drain out through the overflow pipe and not through the beta (outflow) valve.

5.2 Concealed Cistern

5.2.1 *Construction*

The body of the concealed cistern (*see* Fig. 5) shall be made of high density polyethylene material conforming to IS 7328 and the thickness of the body shall not be less than 5 mm.

All working parts such as inlet valve/beta valve shall be so designed so as to operate smoothly and efficiently inside concealed cistern without touching the wall of the cistern.

5.2.2 *Flush Pipe*

The outer diameter of the flush pipe of concealed cistern at the point of connection with the water closet shall be 50 ± 1 mm (*see* Fig. 6).

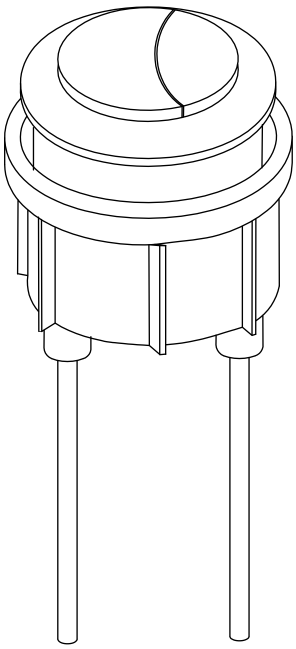

Fig. 4 Dual Flush Push Knob

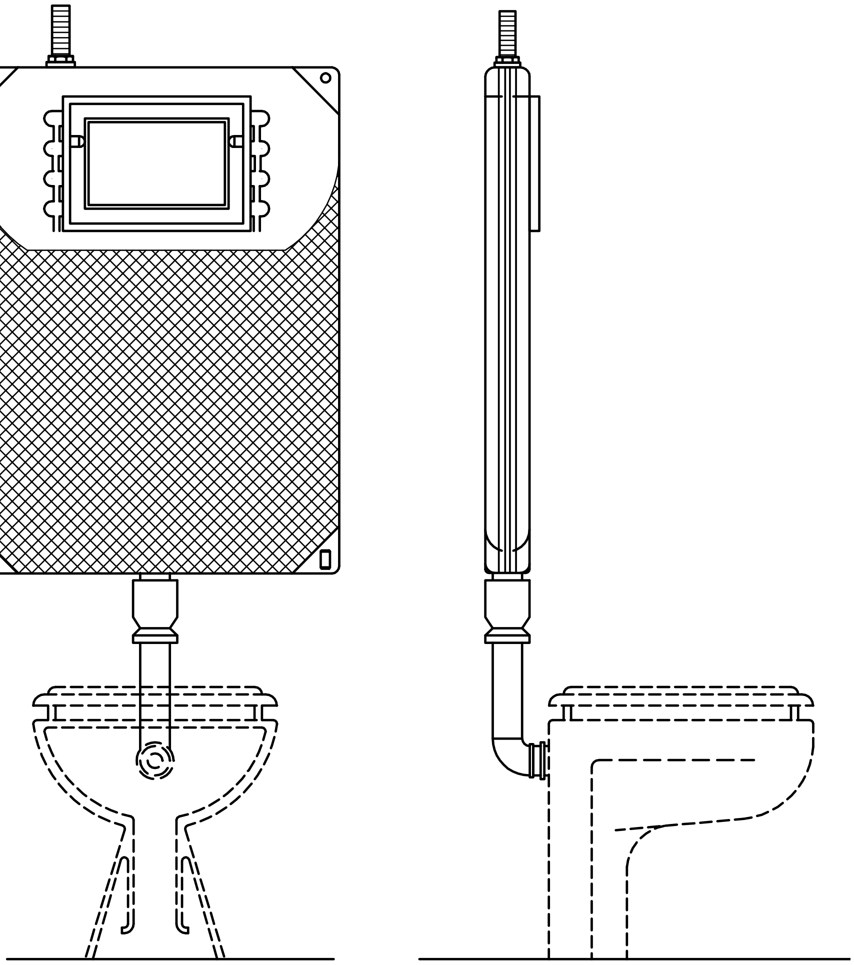

Fig. 5 Typical Illustration of Concealed Cistern

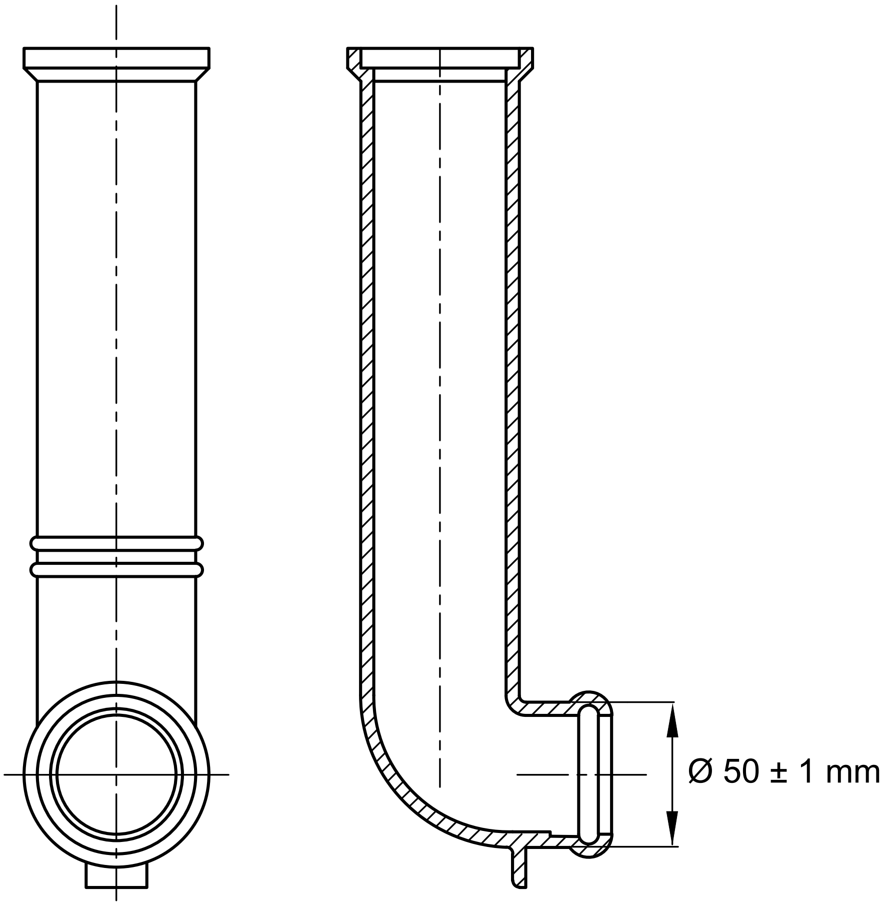

FIG. 6 FLUSH PIPE FOR CONCEALED CISTERN

5.2.3 *Operating Mechanism*

The operating mechanism is provided in a concealed cistern through a flush plate (*see* Fig. 7). The size of the dual flush plate shall be according to the size of the opening area in the concealed cistern.

6 FINISH

6.1 The surface of the cistern including cover shall be free from blisters and delamination and reasonably free from flow lines, streaking or colour variations. The cistern and cover when tested in accordance with the method given in IS 12235 (Part 3) shall be opaque to light, transmitting not more than 0.2 percent of the visible light falling on them.

6.2 The surface of the cistern shall be such to not allow any leakage. The concealed cistern shall be covered with net for installation purposes.

7 OPERATIONAL AND PERFORMANCE REQUIREMENTS

7.1 Flushing Arrangement

The cistern under working conditions and with the float valve in closed position shall operate on a single operation of the operating mechanism. The valve used for flushing purposes shall be completely leak-proof.

7.2 Working Water Level

The working water level shall be a minimum of 6.5 cm below the effective top edge of the cistern and shall be legibly and permanently marked on the inside of the cistern. Effective top edge shall be taken as edge of the top of the body without considering bead.

7.3 Freedom from Leakage

The flushing system shall be capable of being rapidly brought into action when the water is at the working

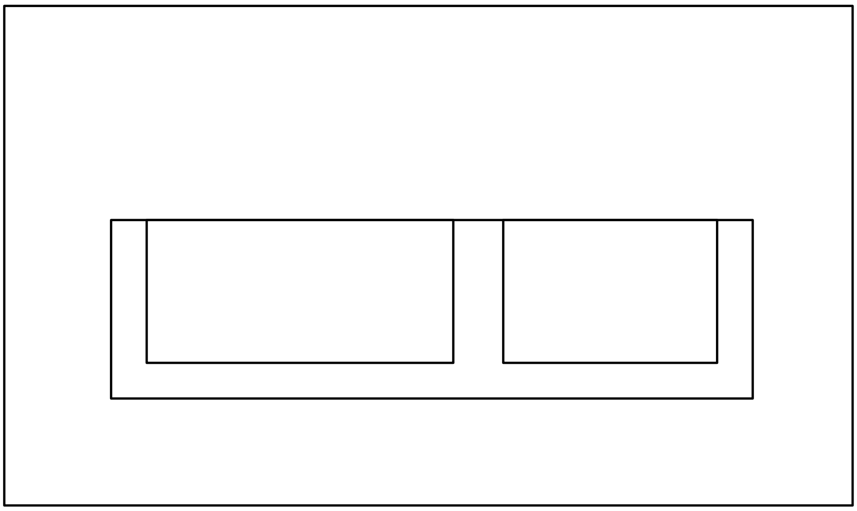

FIG. 7 TYPICAL FLUSH PLATE

water level, but shall not leak into the flush pipe when the water is up to 10 mm above the invert of the overflow pipe.

7.4 Reduced Water Level

The discharge shall operate satisfactorily when the cistern is filled to a level up to 10 mm below the working water level.

7.5 Discharge Capacity

When tested in accordance with the procedure described in **9.1**, dual-flush cisterns of,

a) 6/3 litres capacity shall discharge 6 ± 0.5 litres and a reduced flush of 3 ± 0.5 litres, respectively;

b) 4.8/2.8 litres capacity shall discharge 4.8 ± 0.5 litres and a reduced flush of 2.8 ± 0.5 litres, respectively; and

c) 4/2 litres capacity shall discharge 4 ± 0.5 litres and a reduced flush of 2 ± 0.5 litres, respectively.

7.6 Discharge Rate

When tested in accordance with the procedure described in **9.2**, the discharge rate for flushing cistern of:

a) 6/3 litres capacity shall be 6 ± 0.5 litres within 4.0 s and 3 ± 0.5 litres within 2.0 s for full and reduced flush, respectively;

b) 4.8/2.8 litres capacity shall be 4.8 ± 0.5 litres within 3.2 s and 2.8 ± 0.5 litres within 1.9 s for full and reduced flush, respectively; and

c) 4/2 litres capacity shall be 4 ± 0.5 litres within 2.7 s and 2 ± 0.5 litres within 1.4 s for full and reduced flush, respectively.

The cistern shall be so designed that there is no appreciable variation in the force of the flush during the discharge of the required quantity of water.

8 SPECIAL REQUIREMENTS

8.1 Distortion Resistance Test

The cistern, complete with its fittings, shall be installed and filled as described below and observed for any distortion:

a) Fasten the cistern, complete with its fittings and cover by its normal fixing devices to a solid background.

b) Fill the cistern with water to the marked water line.

The cistern shall not bulge more than 6 mm and the cover shall not be dislodged.

8.2 Dead Load Test

When the flushing mechanism incorporates lever, the cistern, complete with its fittings, when installed and filled as described in **8.1** and tested by the application of a dead load of 230 N applied 6 mm from the end of the operating lever arm for 30 sec, shall not distort to such an extent that any part becomes detached. In the case of other operating mechanism, the dead load applied shall be a mass equivalent to the operating force required to overcome the normal hydrostatic head. Thirty seconds after the load is removed, the function and appearance of the cistern shall not be impaired.

For top actuation flushing cistern, such as those with push-knob at the top, this test is not applicable.

8.3 Front Thrust Test

The front thrust test shall be applied only to cisterns intended for low-level use. The cistern, complete with its fittings, when installed and filled as described in **8.1** and tested by the method described in Annex B, shall not distort to such an extent as to be inoperable or unsightly when the load is removed.

8.4 Impact Test

The cistern, complete with its fittings, when installed and filled as described in Annex C, shall show no defect after one impact.

8.4.1 The test shall be repeated with empty cistern. The cistern shall show no defect after the further impact.

9 TESTING PROCEDURE

Cisterns shall be tested in accordance with the test procedures given in **9.1**, **9.2** and **9.3**. The test in **9.1** and **9.2** may be combined in one operation, if desired.

9.1 Test for Discharge Capacity

With the water supply shut off or the cistern disconnected, and with the float valve fitted, fill the cistern with water up to the marked water line. Operate the flush mechanism and on completion of the flush, measure the quantity of water that has to be added to refill the cistern to the level of the marked water line. Alternatively, any suitable device may be used for measuring the quantity of water discharged from the cistern. The cistern should have a flush pipe fitted but need not be connected to a pan for this test.

9.2 Test for Discharge Rate

Connect the cistern to an appropriate flush pipe (*see* **9.2.1**). Fill the cistern to the water line as for the capacity test and place a vessel under the open end of the flush pipe. Operate the flush mechanism and as water appears at the open end of the flush pipe start a stop watch. At the end of 4.0 s for full flush and 2.0 s for reduced flush in case of a dual-flush cistern of 6/3 litre capacity; 3.2 s for full flush and 1.9 s for reduced flush in case of a dual flush cistern of 4.8/2.8 litre capacity; and 2.7 s for full flush and 1.4 s for reduced flush in case of a dual flush cistern of 4/2 litre capacity, rapidly draw the vessel clear or otherwise divert the flow of water. Ascertain either by measuring or weighing the volume of water collected in the vessel.

For measuring the discharge rate, repeat the same operation for full flush and that for reduced flush, separately for 3 times each and calculate the average discharge rate of full flush and reduced flush of the cistern.

9.2.1 For the purpose of test, the following shall be deemed to be the appropriate flush pipe:

9.2.2 A vertical polyvinyl chloride (PVC) pipe, 300 mm long in case of water closet, having a nominal internal diameter of 38 mm and outer diameter of 40 mm. In case of squatting pan, the flush pipe shall be minimum 700 mm and rest will be the same.

9.3 Endurance Test

A sample of flushing cistern picked at random from production shall be first checked for conformity to the requirements for materials and construction, operational and performance requirements (*see* **7**) and special requirements (*see* **8**), and if it complies with these requirements, it should be operated 30 000 times. After this test, the cistern and its component parts shall not show any damage or defects and all the parts shall be satisfactory; necessary checks shall be made for this purpose. During the test run of 30 000 times, the valve should show no sign of leakage when the cistern is operated to its rated capacity.

NOTE — This is a type test to be carried out by recognized testing laboratory and shall be conducted whenever there are changes in the design or materials or manufacturing process or construction. Even if no change is envisaged, this test shall be done once in a year.

10 SAMPLING AND CRITERIA FOR CONFORMITY

The sampling procedure and criteria for conformity of a lot to the requirements of this specification shall be as specified in Annex D.

11 SUPPLY CONDITIONS

Flushing cisterns shall be supplied complete with all the components as listed in Table 1 including flush pipes (*see* **5.1.3** *and* **5.1.3.1**).

12 OPERATING INSTRUCTIONS

Every cistern shall bear the operating instructions in legible lettering in the form of a leaflet. Typical operating instructions of a dual flush cistern and a concealed cistern with push-knob operating mechanism is given in Fig. 8.

In addition, when so ordered by the purchaser, a separate self-adhesive or other suitable label shall be supplied for use in association with the operating mechanism when the cistern is installed in a concealed position.

13 ADDITIONAL REQUIREMENTS FOR WATER EFFICIENCY

For water efficient rating and labelling of cisterns, the requirements given in IS 17650 (Part 1) shall be complied with.

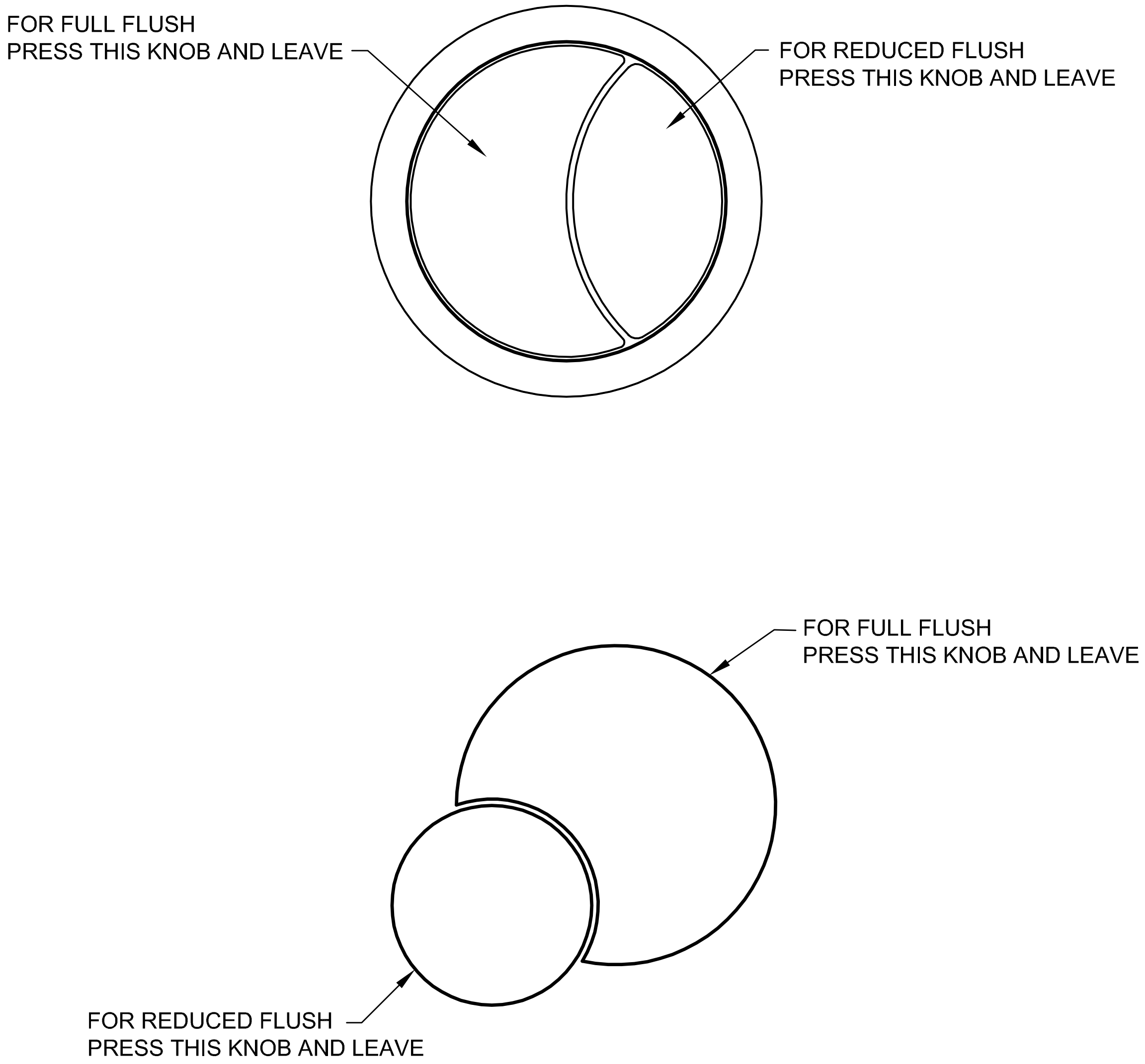
FOR FULL FLUSH
PRESS THIS KNOB AND LEAVE
FOR REDUCED FLUSH
PRESS THIS KNOB AND LEAVE
FOR FULL FLUSH
PRESS THIS KNOB AND LEAVE
FOR REDUCED FLUSH
PRESS THIS KNOB AND LEAVE

FIG. 8 TYPICAL OPERATING INSTRUCTIONS FOR DUAL FLUSH CISTERNS

14 MARKING

14.1 Each cistern shall be marked with the manufacturer's name or trade-mark on the body, either inside or outside as found convenient to the manufacturer. The discharge capacity (*see* **7.5**) shall also be marked on the cistern indelibly. The operating instructions (*see* **12**) in the form of a leaflet shall be provided with the cistern

14.2 A suitable declaration shall be put on each unit indicating to the consumer the list of components supplied.

14.3 The flushing cistern shall also be provided with an instruction specifying that a particular rated cistern capacity shall be used with compatible sanitary appliance of equivalent capacity.

14.4 BIS Certification Marking

Each cistern conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the *Bureau of Indian Standards Act,* 2016 and the Rules and Regulations framed thereunder, and the cistern may be marked with the Standard Mark.

ANNEX A

(*Clause* 2)

LIST OF REFERRED INDIAN STANDARDS

IS No.	*Title*
774 : 2021	Ceramic (vitreous China) flushing cisterns for water closets and urinals — Specification (*sixth revision)*
2267 : 1995	Polystyrene moulding and extrusion materials — Specification (*second revision*)
2556 (Part 8) : 2021	Vitreous China sanitary appliances — Specification: Part 8 Specific requirements of close-coupled and one-piece pedestal washdown and syphonic water closets (*sixth revision*)
4905 : 2015/ ISO 24153 : 2009	Random sampling and randomization procedures (*first revision*)
4984 : 2016	Polyethylene pipes for potable water supply Specification (*fifth revision*)
4985 : 2021	Unplasticized PVC pipes for potable water supplies — Specification (*fourth revision*)
7328 : 2020	Specification for polyethylene material for moulding and extrusion (*second revision*)
9762 : 1994	Specification for polyethylene floats (spherical) for float valves (*first revision*)
11246 : 1992	Glass fibre reinforced polyester resin (GFRP) squatting pans — Specification (*first revision*)
12234 : 2021	Plastic equilibrium float valves for cold water services — Specification (*first revision*)
12235 (Part 3) : 2004	Thermoplastics pipes and fittings — Methods of test: Part 3 Test for opacity (*first revision*)
13049 : 1991	Diaphragm type (plastic body) float operated valves for cold water services — Specification
17650 (Part 1) : 2021	Water efficient plumbing products — Requirements: Part 1 Sanitaryware
17585 : 2021	Beta (outflow) valves for gravity type flushing cisterns — Specification

ANNEX B

(*Clause* 8.3)

FRONT THRUST TEST

B-1 Apply horizontally a front thrust of 110 N by a 150 mm diameter disc, placed as high as possible in front of the cistern and at its centre line (*see* Fig. 9). The disc shall be faced with a soft material so that its face matches with the contour of the cistern shell. The thrust shall be applied for a period of 5 min. Subsequently, while the thrust is still in position, the cistern shall be tested for its satisfactory operation.

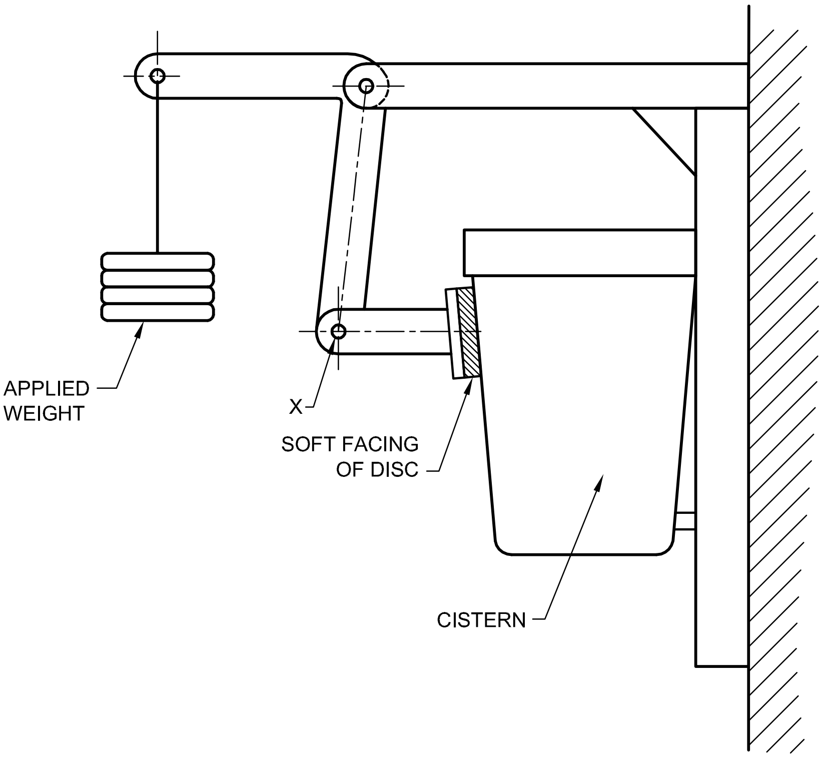

Fig. 9 Arrangement for Front Thrust Test

ANNEX C

(*Clause* 8.4)

IMPACT TEST

C-1 Suspend a 1 kg steel ball by a fine wire 2.5 m long, the point of suspension being located vertically over the point of impact. Release the ball from a point directly in front of the cistern at a horizontal distance of 1 m from the point of impact, the point of impact being 75 mm from the bottom and on the centre line of the cistern. Carry out the test at ambient temperature or, in case of dispute, at 27 ± 2 °C.

ANNEX D

(*Clause* 10)

SAMPLING AND CRITERIA FOR CONFORMITY

D-1 SAMPLING

D-1.1 Lot

In any consignment, all the cisterns made of the same material, of the same type and from the same batch of manufacture shall be grouped together to constitute a lot.

D-1.1.1 Samples shall be selected and tested from each lot separately to determine conformity of the lot to the requirements of this specification.

D-1.2 The number of cisterns to be selected from a lot shall depend upon the size of the lot and shall be in accordance with col 2 and col 3 of Table 2.

D-1.3 The cisterns for the sample shall be selected at random from the lot. For ensuring randomness of selection, procedures given in IS 4905 may be followed.

D-2 NUMBER OF TESTS

D-2.1 All the cisterns (*see* col 3 of Table 2) shall be examined for materials **(4)**, construction **(5)**, finish **(6)** and tested for discharge capacity test **(7.5)** and discharge rate **(7.6)**.

D-2.2 The number of cisterns to be subjected to distortion resistance test **(8.1)**, dead load test **(8.2)**, front thrust test **(8.3)**, impact test **(8.4)** shall be in accordance with col 5 of Table 2. This sub-sample shall be selected from those cisterns which have already been examined and tested as in **D-2.1** and have been found conforming to the requirements of this standard.

D-3 CRITERIA FOR CONFORMITY

D-3.1 The lot shall be considered as conforming to the requirements of this specification if the conditions in **D-3.1.1** and **D-3.1.2** are satisfied.

D-3.1.1 The number of cisterns failing to satisfy the requirements of one or more of the characteristics mentioned in **D-2.1** shall not exceed the corresponding number given in col 4 of Table 2.

D-3.1.2 The number of cisterns failing in one or more of the tests mentioned in **D-2.2** shall not exceed the corresponding number given in col 6 of Table 2.

Table 2 Sample Size and Criteria for Conformity

(*Clauses* D-1.2, D-2.1, D-2.2, D-3.1.1 *and* D-3.1.2)

Sl No. (1)	Lot Size (2)	Sample size (3)	Permissible Number of Defective from sample (4)	Sub-sample size (5)	Permissible Number of Defective from Sub-sample (6)
i)	Up to 50	8	0	5	0
ii)	51 to 90	13	1	5	0
iii)	91 to 150	20	1	8	0
iv)	151 to 280	32	2	13	0
v)	281 to 500	50	3	13	0
vi)	501 to 1 200	80	5	20	1
vii)	1 201 to 3 200	125	7	32	2

ANNEX E

(*Foreword*)

COMMITTEE COMPOSITION

Sanitary Appliances and Water Fittings Sectional Committee, CED 03

Organization	*Representative(s)*
Municipal Corporation of Greater Mumbai, Mumbai	Hydraulic Engineer (Shri A. S. Rathore) (***Chairman***)
Brihan Mumbai Licensed Plumbers' Association, Mumbai	Shri Kishor V. Merchant Shri Bijal M. Shah (*Alternate*)
Building Materials and Technology Promotion Council, New Delhi	Shri S. K. Gupta Shri C. N. Jha (*Alternate*)
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Delhi Jal Board, New Delhi	Chief Engineer (WW) II Superintending Engineer (NW) (*Alternate*)
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Panel for Formulation of Standards for Requirements for
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